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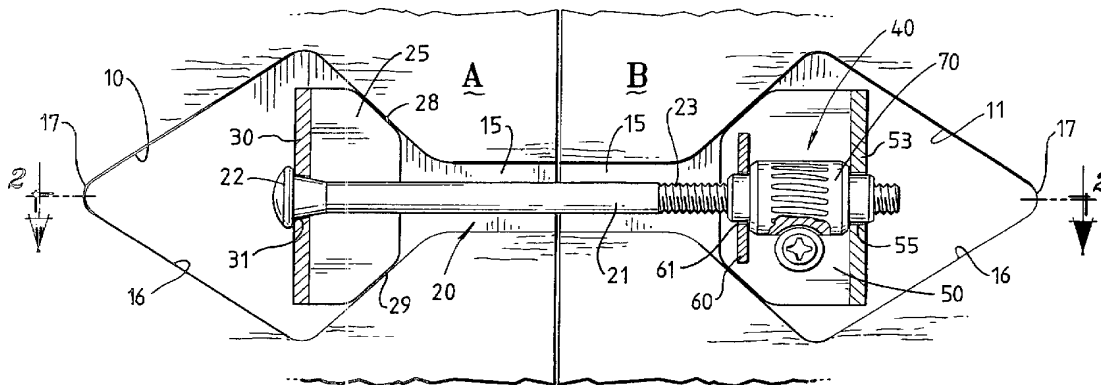
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(54) Title: A BENCH FASTENER



(57) Abstract: Bench fastener (20) comprising elongate rod (21) adapted to support first and second clamping brackets (50, 25 respectively). Rod (21) being in threaded engagement with the first bracket (50) and includes stop (22) that prevents removal of the second bracket (25) from one end of the rod (21). Drive means (40) is adapted to be engaged by a powered driver (not shown) to turn rod (21) to axially displace first bracket (50) relative to rod (21). Fastener (20) can be installed in aligned recesses (10, 11) and used to interconnect abutting sections (A, B) of a bench top.



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TITLE

A BENCH FASTENER

5 INTRODUCTION

This invention relates to a bench fastener and in particular relates to fasteners that are used to interconnect sections of benchtops.

10

BACKGROUND OF THE INVENTION

Modern day cabinet makers frequently have a need to join in parallel abutting contact large planar pieces that constitute a benchtop. One means of ensuring a good firm join is to provide a nut and bolt assembly that is located across the join in recesses in the underside of the bench tops. The nut and bolt assembly usually support clamping brackets that engage the recesses. By tightening the nut and bolt assembly the brackets are moved closer together so that adjacent surfaces of the recesses are brought into close abutting contact. Bench fasteners of this kind have been sold for many years and whilst being comparatively cheap and frequently used have proved both awkward and slow. In situations where a cabinet maker is assembling a large benchtop where there are a number of these fasteners it often proves difficult to obtain access to the nut and the use of a spanner to turn the nut from a difficult access can be both awkward and very slow.

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It is thus considered that there is a need for a benchtop fastener that is easier and quicker to use. It is this need that has brought about the present invention.

35 SUMMARY OF THE INVENTION

According to a first aspect of the present invention there

is provided a bench fastener comprising an elongate rod adapted to support first and second clamping brackets, the rod being in threaded engagement with the first bracket, the rod having a stop that prevents removal of the second
5 bracket from one end of the rod, and having drive means adapted to be engaged by a powered driver to turn the rod to axially displace the first bracket relative to the rod.

According to a further aspect of the present invention
10 there is provided a bench fastener kit comprising a plurality of bench fasteners according to any one of claims 1 to 4 and a translation driver having a shank adapted to fit onto a power tool, translation means coupled between the shank and a drive socket adapted to fit the drive means
15 of the fastener, the translation means changing the direction of the drive through about 90°.

In accordance with a still further aspect of the present invention there is provided a bench fastener comprising an
20 elongate threaded member supporting a first clamping bracket at one end and adapted to screw into a second clamping bracket at the other end whereby rotation of the threaded member alters the spacing of the brackets, wherein the second clamping bracket has a translation mechanism
25 that imparts axially rotation to the threaded member by rotation of a drive means about an axis substantially perpendicular to the axis of the threaded member.

In accordance with a yet further aspect of the present
30 invention there is provided a bench fastener comprising an elongate threaded member supporting spaced first and second clamping brackets whereby rotation of the threaded member alters the spacing of the brackets, wherein the second bracket has a translation mechanism that imparts axial
35 rotation to the threaded member by rotation of a drive means about an axis substantially perpendicular to the axis of the threaded member.

DESCRIPTION OF THE DRAWINGS

5 Embodiments of the present invention will now be described by way of example only with reference to the accompanying drawings in which:

 Figure 1 is a schematic underside view of a first embodiment of a benchtop fastener in situ within recesses
10 on the underside of two pieces of benchtop;

 Figure 2 is a side elevational view of the benchtop fastener of Figure 1;

 Figure 3 is a sectional view of a rack and pinion used with the first embodiment of the benchtop fastener;

15 Figure 4 is a side elevational view of the rack and pinion;

 Figure 5 is a perspective view of a second embodiment of the benchtop fastener;

 Figure 6 is a schematic underside view of the
20 second embodiment of the benchtop fastener in situ within recesses on the underside of two pieces of benchtop;

 Figure 7 is a side elevational view of the benchtop fastener of Figure 6,

 Figure 8 is a side elevational view of a third
25 embodiment of the benchtop fastener,

 Figure 9 is a side elevational view of the benchtop fastener in situ, and

 Figure 10 is an underside view of the benchtop fastener in situ.

30

DESCRIPTION OF THE PREFERRED EMBODIMENTS

 Figures 1 and 6 illustrate the underside of two planar pieces A & B of benchtop that are to be joined in an
35 abutting context either in simple abutment or in a tongue and groove joint. A recess 10, 11 is machined or routed in the underside of both benchtops A & B. Each recess

includes a passageway 15 that extends perpendicular to the edge of the benchtop that then merges into a triangular opening 16 which in turn converges to a closed end 17. The recesses 10, 11 are axially aligned as shown in Figure 1 and are for the purposes of locating a benchtop fastener 20. Conventionally the fastener comprises two clamping brackets 25 and 50 interconnected by a nut and bolt assembly. Each clamping bracket 25 and 50 is located in the recesses 10 and 11.

In a first embodiment, the benchtop fastener 20 comprises an elongate steel shaft 21 with a head 22 at one end and a threaded portion 23 at the other. The head locates a first clamping bracket 25 which is U-shaped to define pair of legs 26 and 27 with tapering end surfaces 28 and 29 and a cross member 30 with a tapered aperture 31 therein through which the shank of the threaded member 21 extends with its head 22 abutting the exterior of the cross member 30. The legs 26, 27 of the U-shaped flange are chamfered to contact the inclined walls of the opening 16 of the recess in a parallel abutment as shown in Figure 1.

The opposite side B of the benchtop has a similarly profiled recess 11 on the underside and the threaded end 23 of the shaft 20 engages a rack and pinion assembly 40 that is supported on a clamping bracket 50 in the form of a U-shaped flange having legs 51 and 52 and a cross member 53 in a similar manner to the flange member 25 in the other recess 10. The legs 51 and 52 are also chamfered to engage the outwardly inclined surfaces of the opening 16 of the recess in parallel abutting contact. A thrust plate 60 with a central aperture 61 extends between the legs 51 and 52 spaced from the cross member 53 which has an aperture 55 coaxial with the aperture 61 of the thrust plate.

The rack and pinion assembly 40 comprises a pinion 70 in the form of a stepped cylinder with a gear toothed exterior

73 that is internally threaded to screw onto the threaded end 23 of the elongate member 21. Shoulders 71 and 72 of reduced diameter are formed on either end of the toothed surface 73 of the pinion 70 to locate in the apertures 55 and 61 of the cross member 53 and thrust plate 60 to allow the pinion 70 to rotate axially relative to the U-shaped flange. The rack 80 shown in greater detail in Figure 3 extends between the legs 51, 52 of the flange 50 and is located within apertures in the legs to be axially rotatable. The geared surface 81 of the rack meshes with the geared exterior 73 of the pinion 70. One end 82 of the rack 80, that is the end projecting downwardly from the recess 11, is provided with a Phillips head cutout 83 enabling access for a screwdriver. Rotation of the rack 80 causes axial rotation of the pinion 70 which in turn causes the pinion to move axially along the threaded shaft to cause the clamping brackets 25 and 50 to either move into proximity with each other or move further spaced apart. Thus to tighten the assembly a Phillips head screwdriver is positioned in the cutout 83 at the end of the rack 80 which is then turned to cause the pinion 70 to rotate and draw the clamping bracket 25 on one end closer to the clamping bracket 50 on the head of the threaded member. In this manner the two brackets 25 and 50 are drawn together and the benchtops A & B are brought into close abutting contact.

A second embodiment of the benchtop fastener 90 is illustrated in Figures 5 to 7 and in principle operates similarly to the first embodiment in that an elongate steel shaft 91 is axially rotated to draw together two opposing clamping brackets 93, 94 by rotating a chuck key 95 about an axis perpendicular to the axis of the steel shaft 91. Steel shaft 91 is threaded at both ends, the thread at a first end 96 extending further along the shaft 91 than the second threaded end 97. Steel shaft 91 is adapted to lie in recessed passageway 15 with the longer threaded end 96

extending through an aperture 99 of bracket 93 and the shorter threaded end 97 extending through an aperture 100 in clamping bracket 94. Clamping brackets 93 and 94 are illustrated in detail in Figure 6 and are substantially similar in shape in that they have a cross member 102, an aperture 99 or 100, and legs 103 and 104 extending from opposing ends of the cross member 102 and at an obtuse angle relative to the cross member. In effect, the brackets 93, 94 are roughly U-shaped such that the brackets sit in opening 16 with legs 103, 104 contacting the inclined walls of opening 16 of recesses 10, 11 in a parallel abutment. Aperture 99 of clamping bracket 93 is internally threaded to threadably receive longer threaded end 96 of shaft 91.

Shorter threaded end 96 of shaft 91 extends through aperture 100 of clamping bracket 94 and engages with a bevel gear 105 having a geared exterior 106. Bevel gear 105 has a tapped opening for receiving shorter threaded end 97. Bracket 94 is also provided with a J-shaped locating bracket 108 located on an adjacent side of the cross member 102 to opposing legs 103 and 104. Locating bracket 108 is integrally formed with clamping bracket 94. Locating bracket 108 hooks over bevel gear 105 so that the hook end 109 of bracket 108 is spaced just above the geared exterior 106 of bevel gear 105. Hook end 109 contains a keyhole 110 which center line is perpendicular to shaft 91.

The driving means is a chuck key 95 which has a locating stub end 112 and a bevelled gear exterior 113 that corresponds with the geared exterior 106 of bevel gear 105. Stub end 112 is adapted to be located in keyhole 110.

The fastener assembly operates to draw together brackets 93 and 94 by inserting stub end 112 of chuck key 95 into keyhole 110. This locates the chuck key in a position perpendicular to shaft 91 and in meshing proximity to bevel

gear 105. Chuck key 95 is axially rotated which, by meshing of geared exteriors 106 and 113, results in the axial rotation of shaft 91. Engagement of longer threaded end 96 with threaded aperture 99 causes clamping bracket 93 to move closer or further from clamping bracket 94 thus respectively tightening or loosening the benchtop fastener 90.

Bevel gear 105 can be removed from shaft 91 by unscrewing it off shorter threaded end 97. This allows the fastener to be used in other fixing arrangements, for example where it is not available to insert the fastener into a recess and rather the bolt is inserted through a hole in the benchtop. The bevel gear is then threaded back on to shorter threaded end 97 and the fastener is used as described above. This practice is suitable in fixing bull nosing on benchtops.

The chuck key is a standard and separate item which does not remain with the assembly after tightening but can be reused on other similar assemblies.

The fact that both embodiments of the fastener assembly can be tightened by simply turning a chuck or a screwdriver means that a power drill with a suitable adaptor or even a hand held screwdriver can be used to tighten the assembly. This means that the tightening/untightening process is much easier and quicker than would be the case where a spanner has to be applied to a nut that is located within the recess. The rack and pinion arrangement and the bevel gear and key arrangement translate the movement through 90 degrees providing ready and easy access to the fastener thus substantially speeding up the assembly process.

In a third embodiment, shown in Figures 8 to 10, the bench fastener 120 is similar to the fastener of the first two embodiments but considerably simpler. The fastener

includes two curved clamping brackets 121 and 122 that are located on an elongate steel rod 123. The steel rod has a threaded end 124 and a squared opposite end 125. A stop 126 or collar extends laterally of the rod at a position inborn of the squared end. As shown in Figure 9, the bracket 121 has a central boss 128 and is internally threaded to accommodate the threaded end 124 of the rod 123. The other bracket 122 simply has a central hole through which the rod 123 extends. The simplicity of this fastener comes about from the use of an off-the-shelf adapter tool T that is illustrated in Figures 8 and 9 and can be coupled to a conventional powered drill (not shown). The tool T incorporates a square input drive shaft S that through pinion gear P, drives an output socket H of hexagonal cross section that has its axis at approximately 90° to the axis of the main drive shaft S. In this way the tool T acts as a translator to transpose the axis through 90°. The octagonal output socket H of the tool can fit on the square drive 125 of the rod 123 to provide the powered drive that causes the bench fastener to pull the two brackets 121, 122 into abutting contact with the portions of the bench as shown in Figures 9 and 10.

The head of the tool T may be magnetic to assist location of the tool T on the square drive 125.

The bolt is preferably 75mm long and the bench fasteners have a height of 18mm to be accommodated in a 23mm routed section in the underside of the bench.

Although a squared end 125 is shown in Figures 8 to 10, it is understood that other drives can be incorporated such as a squared recess for an Allen head key or a female recess for a Phillips type drive head. The important feature is that the rod includes drive means that can be readily driven by the tool that can be attached to a powered drive. Thus, in this embodiment the bench fastener is provided in

the simplest possible form without the need for built in translation device as in the first two embodiments. Purchase of the off-the-shelf tool solves the problem and this tool simply becomes part of the tradesman's equipment.

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It will be understood to persons skilled in the art of the invention that many modifications may be made without departing from the spirit and scope of the invention.

10 For the purposes of this specification it will be clearly understood that the word "comprising" means "including but not limited to", and that the word "comprises" has a corresponding meaning.

15

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A bench fastener comprising an elongate rod adapted to support first and second clamping brackets, the rod being in threaded engagement with the first bracket, the rod having a stop that prevents removal of the second bracket from one end of the rod, and having drive means adapted to be engaged by a powered driver to turn the rod to axially displace the first bracket relative to the rod.
2. The bench fastener according to claim 1 wherein the drive means is a squared drive portion.
3. The bench fastener according to claim 2 wherein the squared drive portion is at one end of the rod and the stop is adjacent the squared drive inboard that end.
4. The bench fastener according to either claim 1 or 2 wherein the squared drive portion is constituted by one end of the rod and the stop is at the other end.
5. A bench fastener kit comprising a plurality of bench fasteners according to any one of claims 1 to 4 and a translation driver having a shank adapted to fit onto a power tool, translation means coupled between the shank and a drive socket adapted to fit the drive means of the fastener, the translation means changing the direction of the drive through about 90°.
6. A bench fastener comprising an elongate threaded member supporting a first clamping bracket at one end and adapted to screw into a second clamping bracket at the other end whereby rotation of the threaded member alters the spacing of the brackets, wherein the second clamping bracket has a translation mechanism that imparts axially rotation to the threaded member by rotation of a drive means about an axis substantially perpendicular to the axis

of the threaded member.

7. The bench fastener according to claim 6 wherein the first clamping bracket is arranged to be located in a recess in a benchtop, the second clamping bracket being adapted to engage in a similar recess on an adjacent surface of the benchtop.

8. The bench fastener according to claim 7 wherein rotation of the drive means imparts movement of the translation assembly relative to the threaded member to bring the brackets closer thereby pulling the benchtops into abutting contact.

9. The bench fastener according to claim 8 wherein the translation mechanism is a rack and pinion, the rack being provided with a screw head at one end to facilitate rotation of the rack, and the pinion being mounted to be axially rotatable in threaded engagement on the elongate member.

10. A bench fastener comprising an elongate threaded member supporting spaced first and second clamping brackets whereby rotation of the threaded member alters the spacing of the brackets, wherein the second bracket has a translation mechanism that imparts axial rotation to the threaded member by rotation of a drive means about an axis substantially perpendicular to the axis of the threaded member.

11. The bench fastener according to claim 10 wherein the elongate member is threadably engaged with the first clamping bracket which is arranged to be located in a recess in a benchtop, and the second clamping bracket is arranged to be located in a recess in an adjacent benchtop.

12. The bench fastener according to claim 11 wherein

the other end of the threaded member is held against axial movement relative to the second clamping bracket by a bevel gear on said end, the bevel gear constituting the translation mechanism.

5

13. The bench fastener according to claim 12 wherein the driving means is a chuck key which meshes axially perpendicularly with the bevel gear.

10

14. The bench fastener according to claim 13 wherein the second bracket is also provided with a locating bracket to correctly locate the chuck key for perpendicular alignment and engagement with the bevel gear.

15

Dated this 13th day of May 2003

SCOTT SMITH

By His Patent Attorneys

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Fellows Institute of Patent and
Trade Mark Attorneys of Australia

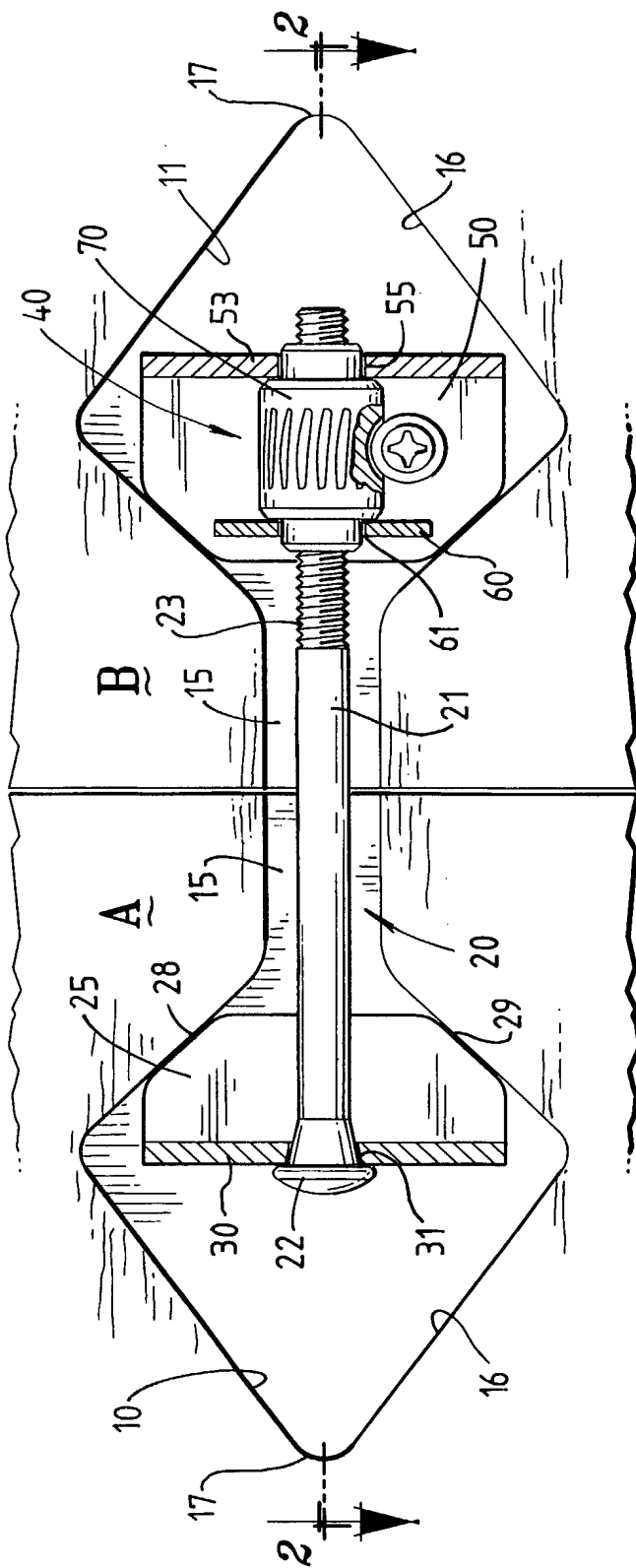


Fig. 1

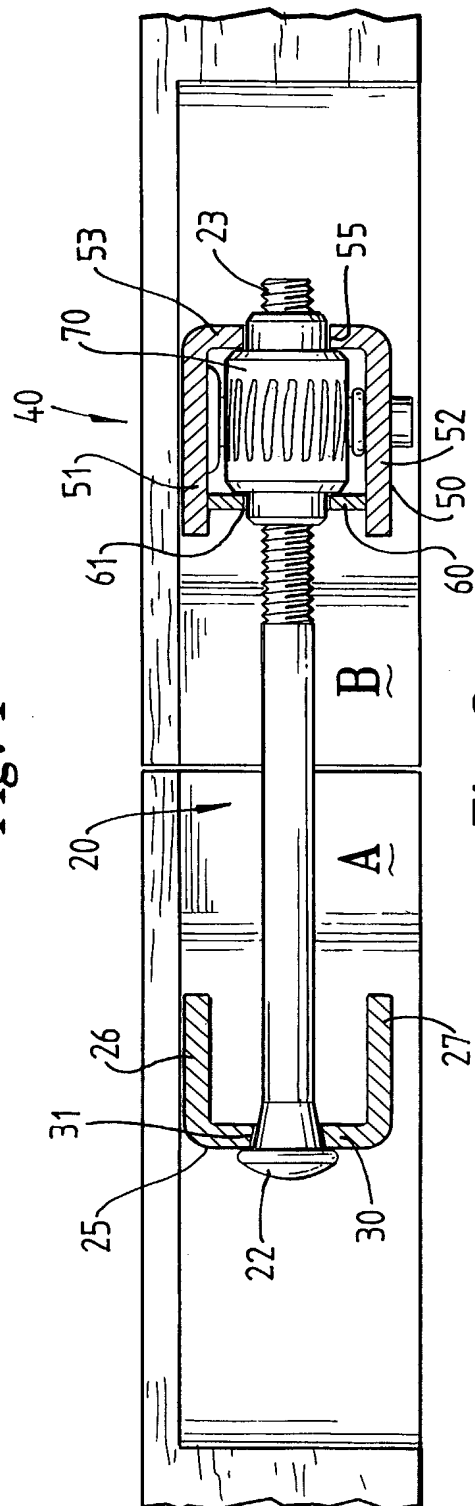


Fig. 2

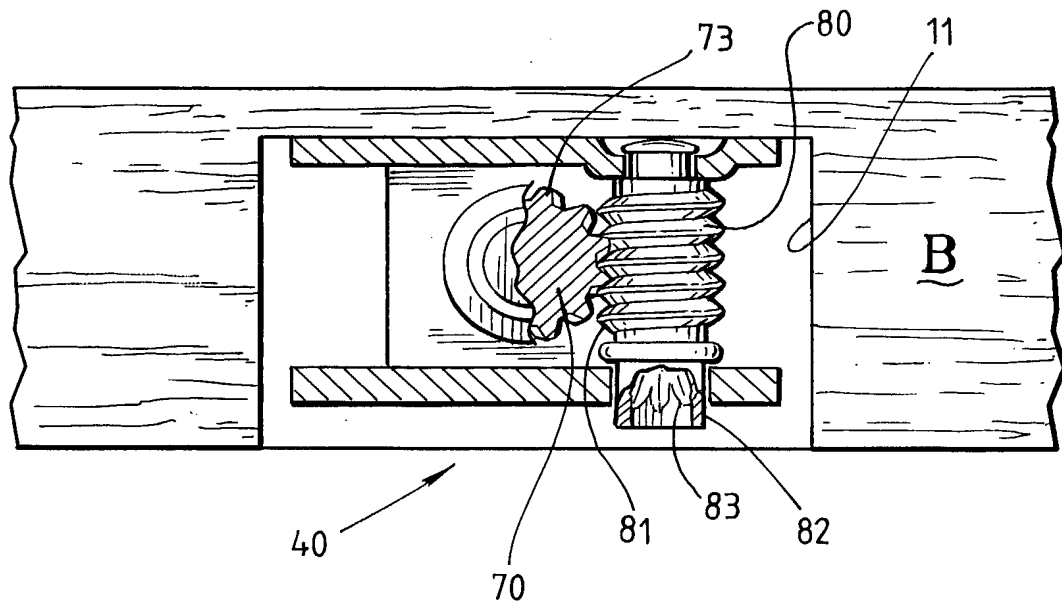


Fig. 3

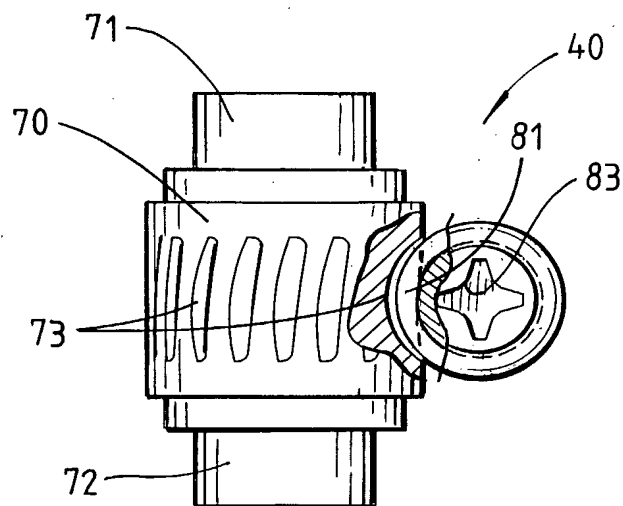


Fig. 4

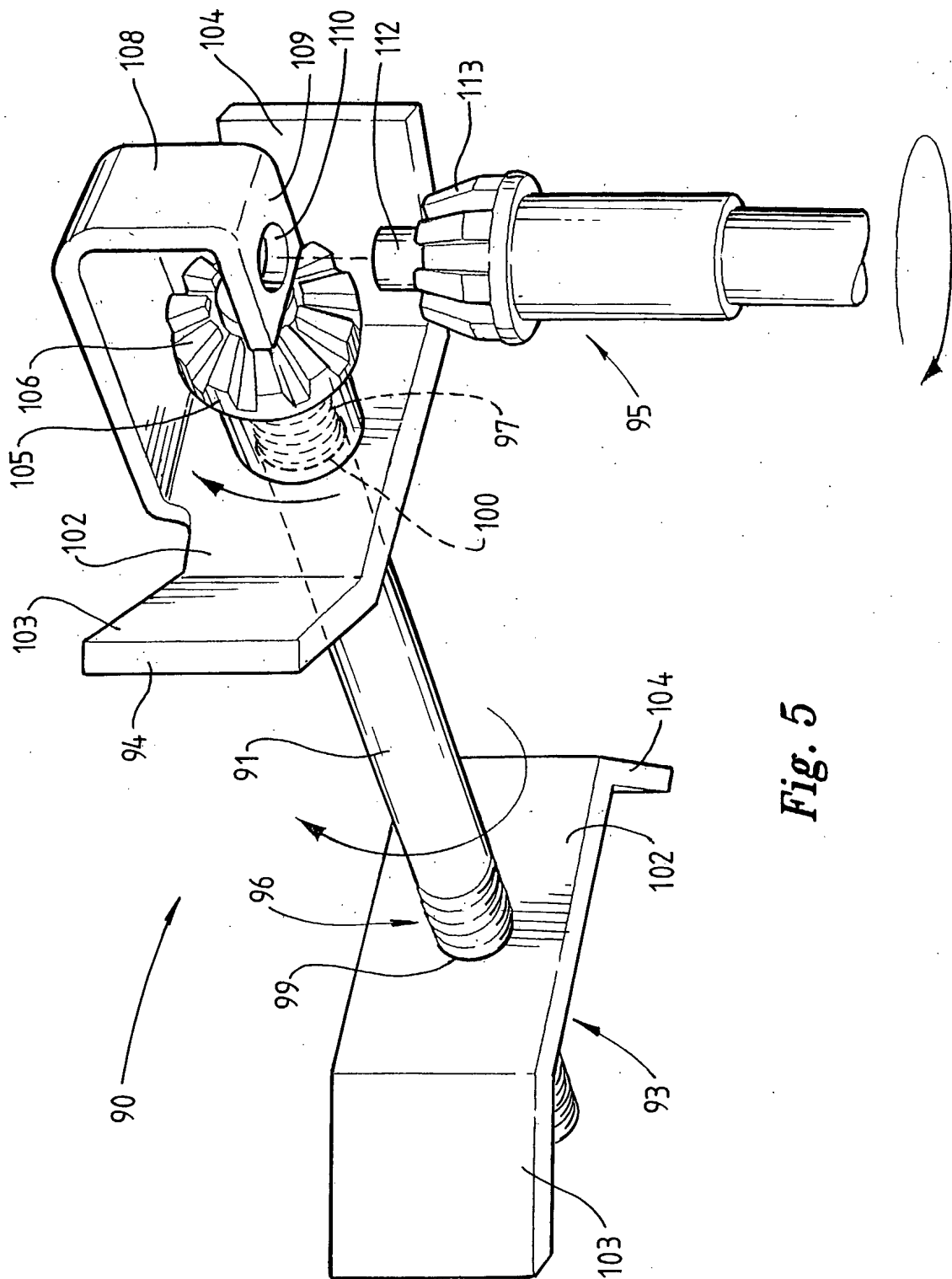


Fig. 5

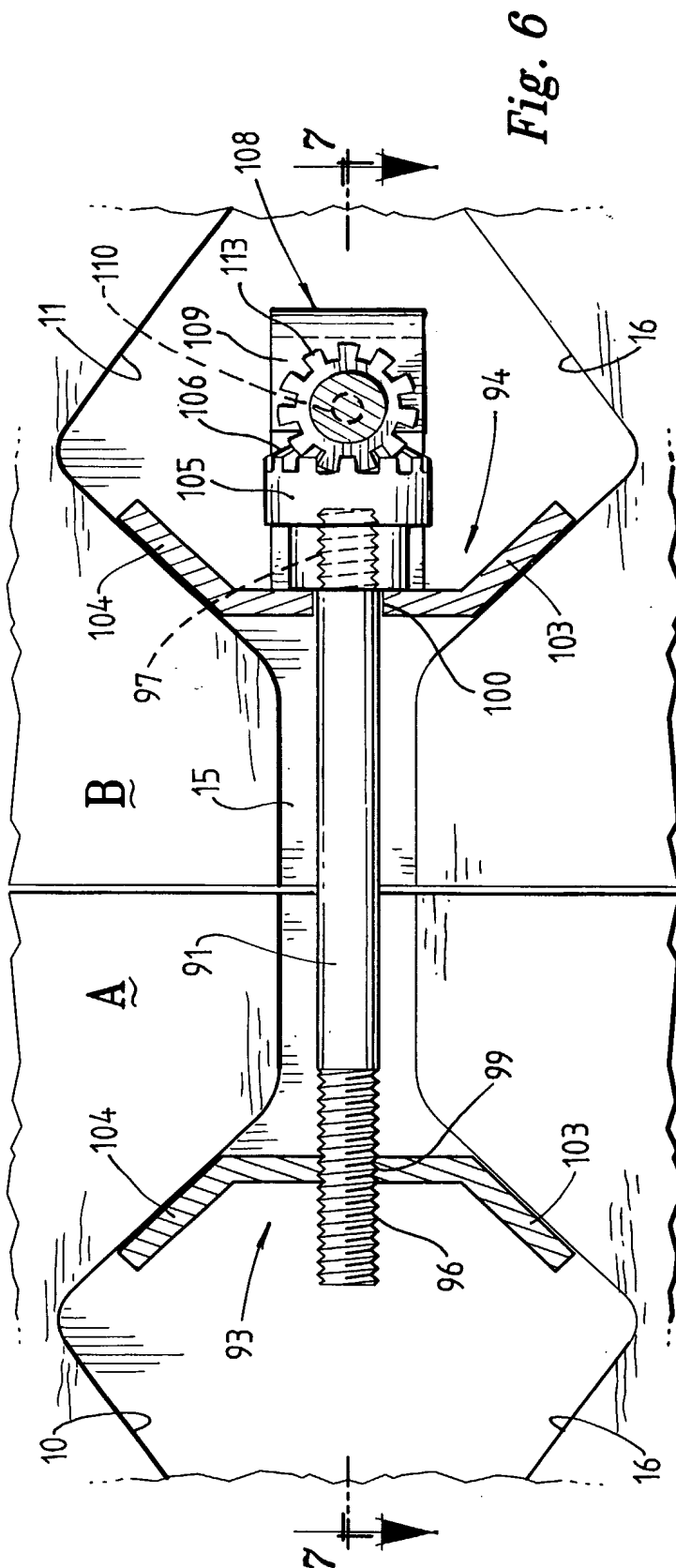


Fig. 6

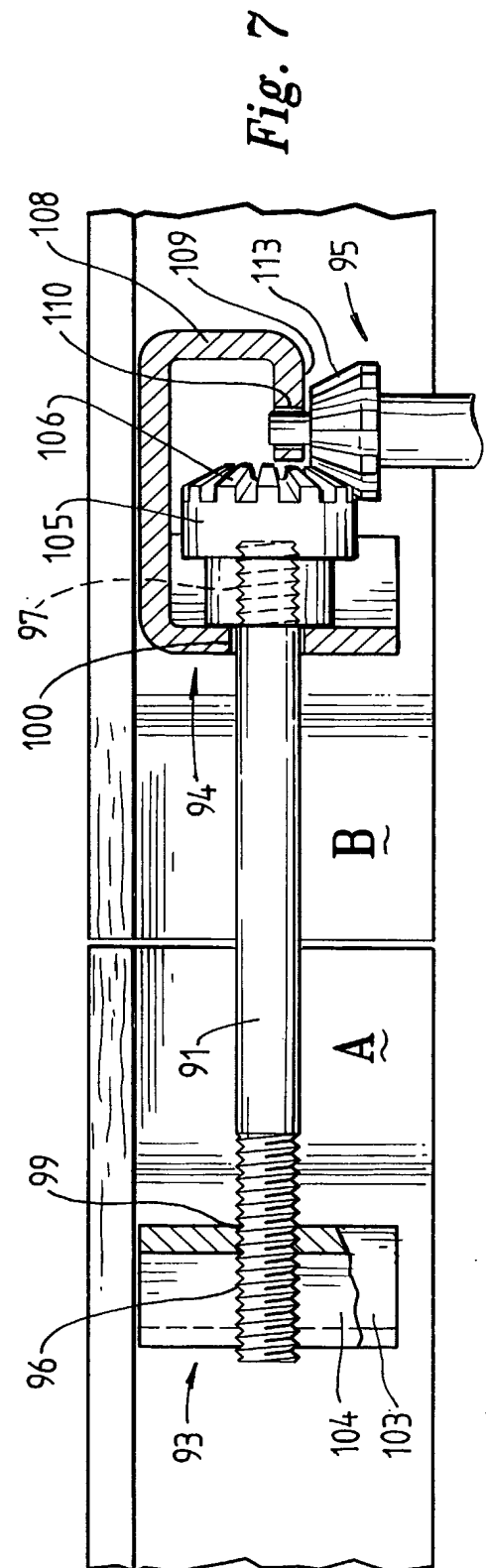


Fig. 7

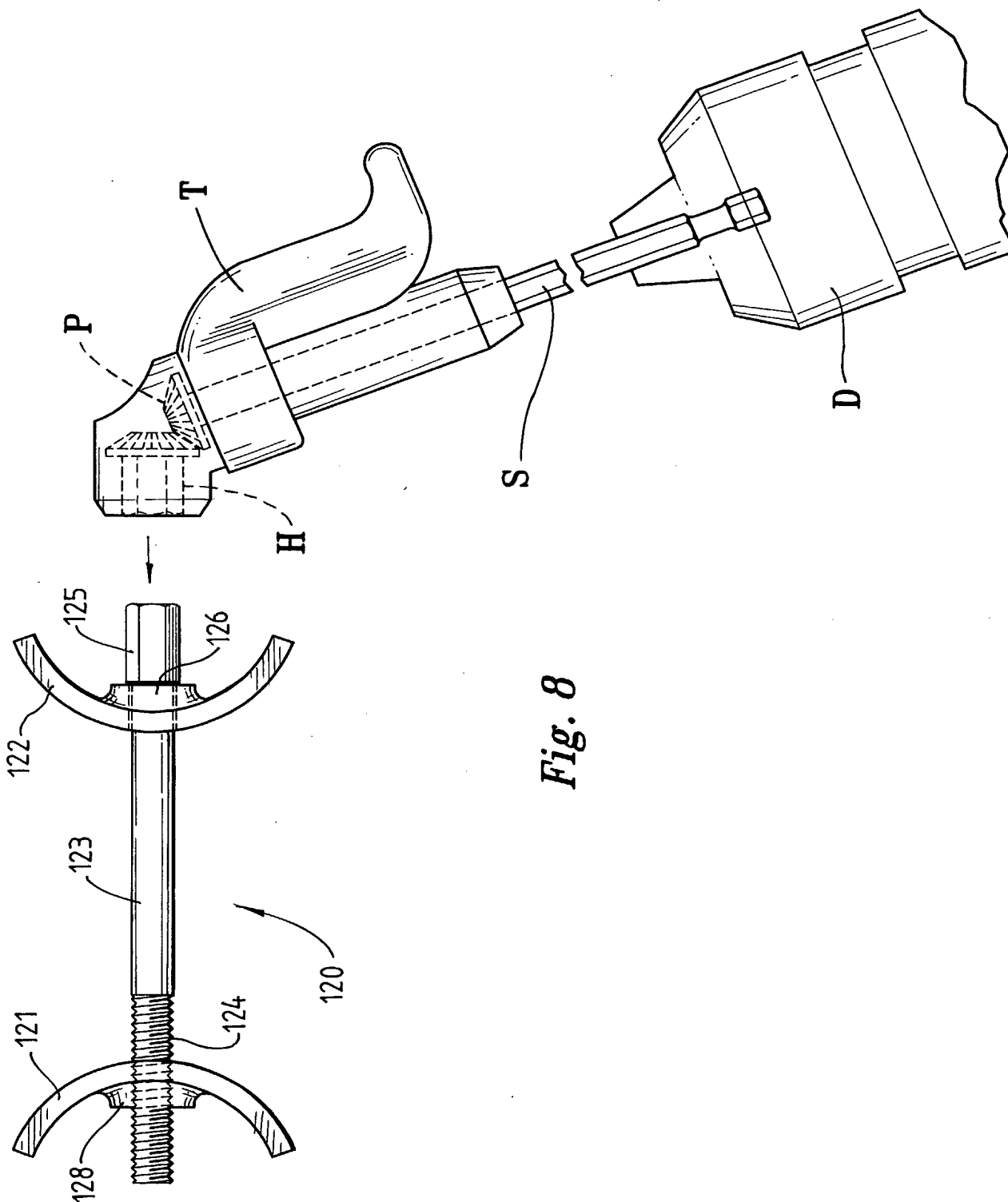
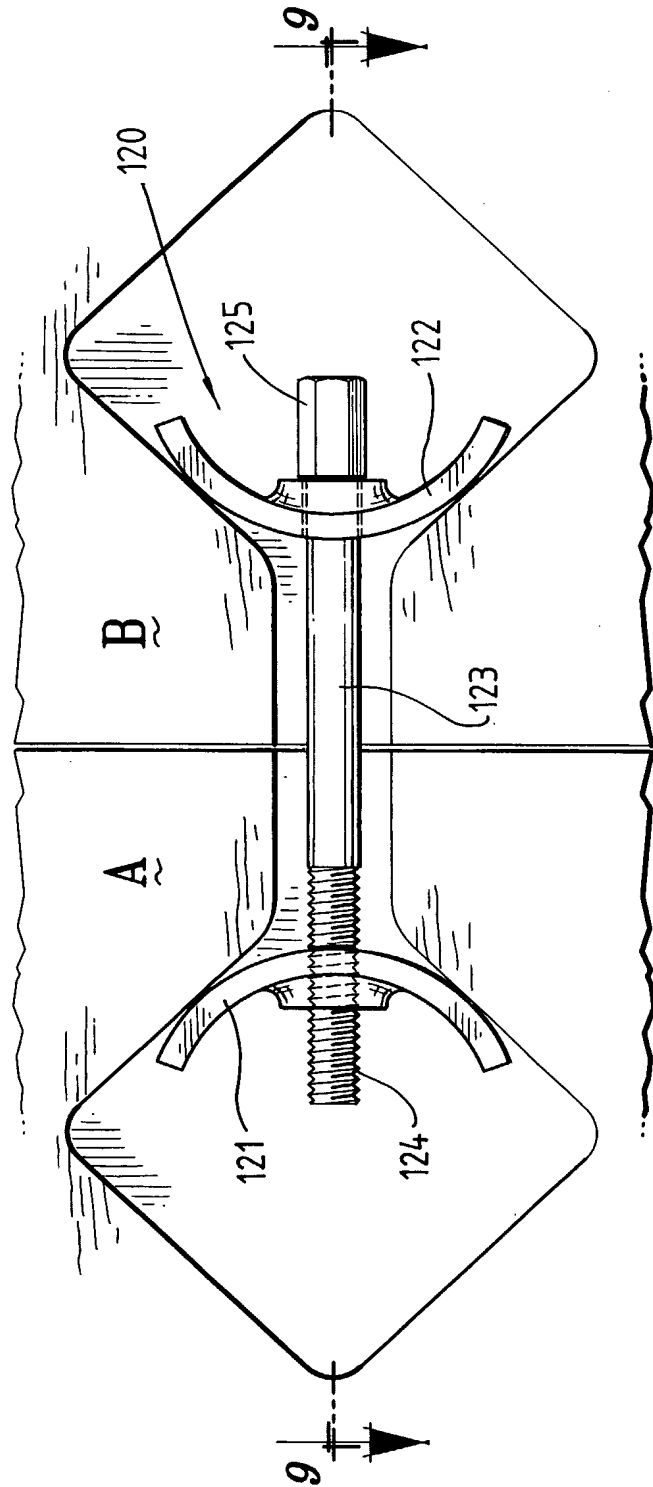
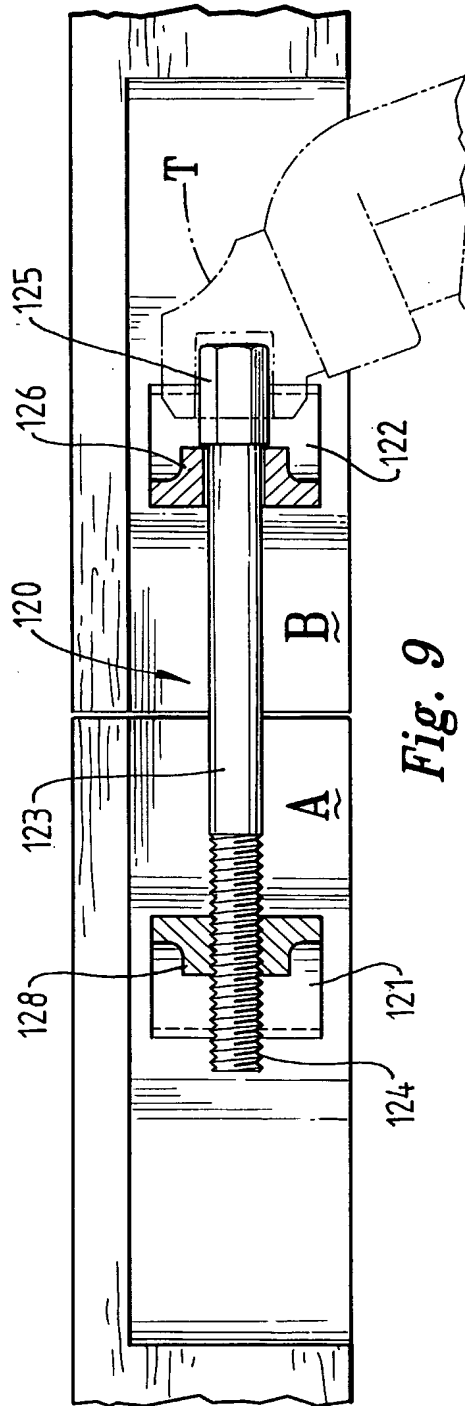


Fig. 8



INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU03/00574

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. ⁷: F16B 12/18, 5/02; A47B 47/04

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

AU: IPC F16B 12/18, 5/02; A47B 47/04

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

DWPI: IPC F16B 12/-, 5/-; A47B 47/- and keywords such as fasten, bracket, clamp, thread and similar terms.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	AU 16514/95 A (CSR LIMITED) 26 October 1995 Figure 11	1-4, 6-10
X	AU 35441/93 A (THE VISADOR CO.(AUSTRALIA) PTY LTD) 30 September 1993 Whole document	1-5
A	DE 4133520 A (DÜRKOPP ADLER AG) 22 April 1993	
A	DE 4210338 A (RIEDER) 13 August 1992	

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Further documents are listed in the continuation of Box C

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See patent family annex

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance
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 "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
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 "P" document published prior to the international filing date but later than the priority date claimed

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 "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
 "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
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Date of the actual completion of the international search
18 June 2003

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26 JUN 2003

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Information on patent family members

PCT/AU03/00574

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member
AU	16514/95	NONE
AU	35441/93	NONE
DE	4133520	NONE
DE	4210388	NONE